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ABSTRACT

Results of a study to determine emotional responses to a city's environmental display are reported. The sample consisted of 148 residents from various socioeconomic and occupational categories in Muncie, Indiana. Similar to cognitive mapping research, the procedure was to show slides of randomly selected sites in the city for participants to identify according to half, quadrant, and street intersection. Responses were defined according to three dimensions: pleasure, arousal, and dominance. Pleasure is defined by adjective pairs such as happy/unhappy or comfortable/uncomfortable. Arousal is determined by adjective pairs such as stimulated/relaxed and excited/calm. Dominance is based on the extent to which an individual feels unrestricted or free to act. Results indicate that perception of a site as pleasant has little influence on memory of it. Sites rated as high in arousal were consistently shown to be sites residents could easily identify. This result presents a compelling case for the role of increases in arousal as a sufficient condition for reinforcement and learning. Research on factors which create arousal suggests sites determined as visually, inferentially, and functionally distinctive (e.g., a large building, a unique building, and a bus station) are most likely to be rated as arousing. (Author/KC)

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Emotional Correlates of Identifiable Urban Sites[1]

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SO 013 297

Paper presented at the 52nd Annual Convention of the Eastern Psychological Association, New York. April 24, 1981.

Emotional Correlates of Identifiable Urban Sites[1]

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A rapidly increasing literature has addressed the process by which environmental stimuli are transformed by the perceiver into ordered cognitive representations (Downs & Stea, 1973; Moore & Golledge, 1976; Saarinen & Sell, 1980). Often called "cognitive maps," these representations are the result of acquiring, coding, storing, recalling, and decoding "information about the relative locations and attributes of phenomena in (the) everyday environment" (Downs & Stea, 1973, p. 9). Although they are maps by analogy only, they are assumed to serve many of the same functions as cartographic maps and, in so far as they facilitate physical movement within the environment, enhance the acquisition of environmental rewards, and aid in interpreting the meaning of environmental components, have considerable adaptive value (Kaplan, 1976).

As with any psychological response to the environment, cognitive maps vary widely as a function of characteristics of the perceiver (Ladd, 1970; Orleans, 1973; White, 1980), the physical stimuli encountered (Carr & Schissler, 1969; Lynch, 1960), and the interpretation of the physical environment by the perceiver (Zannaras, 1976). This is a familiar causal trichotomy to psychologists and, indeed, is reflective of general epistomological issues concerning cognition and behavior (Moore & Golledge, 1976). Yet, despite attention given the general area, the relation between subjective, emotional responses to urban sites and the likelihood of their inclusion in cognitive maps remains unclear and understudied (Stokols, 1978). My

discussion will consider this problem.

Affective responses occur at a number of organismic levels (Berlyne, 1967) and have been identified as resulting from a complex interplay of socio-cultural (Altman & Chemers, 1980), physiological, cognitive (Valins, 1966, 1967), and physical variables. Identification of environmental antecedents and resulting affective responses have thus taken a wide range of forms. However, within the context of emotional responses to the city's environmental display several conceptual and methodological considerations argue for an approach which concerns itself with those emotions reported as experienced by the perceiver. If issues of stimulus configuration, physiological responses, adaptation level (Wohlwill, 1966; Wohlwill & Kohn, 1976), and the like are temporarily set aside, a question of considerable heuristic value still remains: How does the environment make the perceiver feel?

Mehrabian and Russell (1974) (Russell & Mehrabian, 1977) have addressed several of these issues in their efforts to construct a general model of emotion and an instrument for measuring emotional responses to the environment. In their model stimuli are defined according to the quality of affective responses they elicit on a semantic differential instrument. Responses, in turn, are defined by three orthogonal factor analytic dimensions: Pleasure, Arousal, and Dominance. The first of these dimensions, Pleasure, is defined by adjective pairs such as happy-unhappy and comfortable-uncomfortable. On the second scale, Arousal, adjective pairs such as stimulated-relaxed and excited-calm load heavily. The third factor, Dominance, is based on the "extent to which (an individual) feels unrestricted or free to act (1974, p. 19)"; it appears to capture the notion of perceived control within

the environment.

Several hypotheses may be derived from Mehrabian and Russell's analyses (1974) and from the perception literature in general. First, environmental sites perceived as pleasurable are also likely to be perceived as positively reinforcing (Premack, 1965; Russell & Mehrabian, 1976, 1977). If this is the case then in order for an individual to return for future reinforcement pleasurable sites must be encorporated into his or her cognitive map. Alternatively, extremely unpleasant sites should also be remembered due to their aversively reinforcing qualities.

Arousing urban sites, likewise, may be assumed to be excellent candidates for inclusion in cognitive maps. The general issue of arousal has, of course, been explored by many investigators (e.g., Berlyne, 1960, 1971; Berlyne & Ditkofsky, 1976; Fiske & Maddi, 1961) and moderate to high levels of arousal have been identified as enhancing a whole series of exploratory, learning, and attending activities. The general finding within this complex literature is that preference for stimuli is an inverted-U shaped function (Berlyne, 1960, 1967; Dember & Earl, 1957; Wohlwill, 1968, 1975) of level of arousal. Low arousal levels are insufficiently interesting to provoke attention, while high arousal levels overwhelm information processing capacities. However, preference is not necessarily related to memory for a site. A more probable relation (Berlyne, 1960) between memory for a site and arousal level would be a simple positive linear function; low arousal levels fail to prompt attention, moderate levels achieve attention and are preferred, while high levels achieve attention and are remembered due to their aversive qualities.

The interaction between ratings of arousal and pleasantness has consumed

considerable space within the literature (e.g., Russell & Mehrabian, 1976; Wohlwill & Kohn, 1976). Of particular importance here, however, is how these dimensions influence memory for an urban site. Russell and Mehrabian (1976) have suggested pleasant and highly arousing sites will be rated high on measures of approach while unpleasant and arousing sites will be avoided. If true, then both types of urban sites should be remembered; the former for its positively reinforcing qualities and the latter for its negatively reinforcing qualities. There should be no interaction of these two dimensions in their effect on memory for an urban site; sites would be remembered based on arousal level alone.

Finally, sites in which an individual perceives himself to be in control and not overwhelmed are scored as low in Dominance. The relation between Dominance and memory for a site is unclear. However, as with Pleasure, to the degree that perceptions of high control are positively reinforcing and perceptions of low control are reinforcing of aversive responses, then memory for sites should be an U-shaped function of Dominance.

In earlier studies (White, 1980, 1981) I have asked urban residents to identify several randomly selected sites using a procedure for cognitive map assessment developed by Milgram (1972). In order to test present assumptions, color slides used in these prior studies were rated on each of Mehrabian and Russell's (1974) three emotional dimensions by subjects who were unfamiliar with the city. These dimensions and their interactions were then employed within a multiple regression analysis to determine if they were capable of predicting a site's correct identification.

Procedure

City. Data was collected in Muncie, Indiana -- a city long considered

to be sociologically representative of medium-sized American cities (estimated pop. = 77,947; U.S. Census, 1979). Muncie -- or Middletown as Lynd and Lynd (1929) termed it -- lacks much of the monumental architecture of larger cities and tends visually to be a city of suburbs, a declining downtown, suburban shopping malls, factories, and an university area.

Subjects. The first group of subjects consisted of 148 (n = 112 male; 31 female) residents of the city. Although a true random sample was unobtainable, an effort was made to obtain representatives from many socioeconomic and occupational categories. Included were: church groups, a men's civic club, transients, factory workers, firemen, college students, and office workers. All subjects were 18 years or older (M = 34.8); they have been more fully described elsewhere (White, 1980). The second group of subjects consisted of 73, first-term freshmen students (n = 32 male; 41 female) who were not prior residents (M age = 18.9). All reported they were "very (6) to extremely (7)" unfamiliar with Muncie on a 7-pt. scale.

Method. Information regarding the likelihood of a site's appearance in residents' cognitive maps was collected using an objective procedure developed by Milgram (1972). In many ways, this procedure is analogous to an intelligence test; subjects are shown randomly selected sites within the city and asked to identify them. Correct responses are identifiable and scores from different individuals may be legitimately compared. Although several other procedures also have such attributes (Golledge, 1976), Milgram's is particularly straightforward in administration and allows comparability across cities.

Sites were selected by first dividing the city into halves (N - S) and quadrants (NW-NE-SW-SE) defined by the major north-south and east-

west axial avenues. Thirty intersections were then selected at random and color slides taken of each; no intersections fell on the dividing avenues. Intersections were photographed in such a way that as much visual information as possible was included in each photograph. Street signs, however, were taped over. These photographs and a schematic map of the city were shown in random sequence to resident subjects who were asked to identify each site's location with increasing precision, i.e., location according to city half, quadrant, and street intersection. Correct site identification frequencies were then calculated according to these criteria.

Information regarding the rated emotional characteristics of each site was next obtained by showing a random selection of 10 of the 30 slides to the non-resident subjects. Each subject viewed a different set of 10 slides and rated them using Mehrabian and Russell's scale (1974). Each slide was viewed by 21-26 subjects; mean scores for each slide were used in the analysis.

Results

Rated values for each of the 30 sites are shown in Table 1. Using a nine point rating scale on each dimension (-4 = low; +4 = high), the 30 sites had a mean Pleasure rating of .2336 (SD = 1.9108). Values ranged from 2.86 (Site #7) to -1.58 (#1). Mean Arousal was -.4110 (SD = 1.6055) with a range of 1.06 (#12) to -1.72 (#5). Dominance ranged from .67 (#19) to -.58 (#23); mean Dominance was -.0021 (SD = 1.1654). These values indicate the sites shown of Muncie evoked only mild to moderately strong affective responses.

Insert Table 1 About Here

The Pearson bivariate correlations of the three emotional ratings and site identification scores are shown in Table 2. Contrary to findings reported by Russell and Mehrabian (1977) correlations between Pleasure and Arousal are high, as is the case with Pleasure and Dominance. Although the correlation between Arousal and Dominance is non-significant, it is still higher than these authors have obtained. The three site identification indices are all highly intercorrelated, as was expected and as is desirable. Arousal is significantly correlated with all three measures of site identification. Likewise, Dominance is significantly related to two measures of identification. Pleasure appears unrelated to any of the site identification measures.

Insert Table 2 about here

Initial step-wise, multiple regression analyses indicated (Table 3) that Arousal successfully predicted each of the three measures of cognitive map accuracy ($p < .001$) and alone accounted for up to 38.6% of obtained variance. In all cases this relationship was positive; beta values ranged from .634 to .739. No other main effect nor interaction was observed to contribute significantly to criterion variance. Nonlinear effects were examined through the introduction of quadratic transformations into subsequent hierarchical multiple regressions (Cohen & Cohen, 1975). None of these transformations assisted significantly in determining criterion variance. Finally, although Arousal identified considerable variance by itself, even with the addition of the other variables 50 to 80% of observed variance remained undetermined.

Insert Table 3 about here

Discussion

Although the data suggest several conclusions, they also raise a number of questions regarding their interpretation. To begin, it appears that perception of a site as Pleasant has little influence on memory for it even though both theory and common sense would predict otherwise. Partial explanation of this finding may lie in the limited range of rated Pleasure for the sites shown. Only half of the Pleasure scale's range was utilized to characterize sites, most ratings clustered around the neutral mid-point. Without the extremes of the continuum represented the likelihood of identifying potential relationships is considerably reduced. Identical observations may also be applied to ratings of Dominance where similar negative findings and scaling restrictions were obtained.

Ratings of Arousal were also restricted in range. Yet, unlike the other two dimensions sites rated by naive judges as high in Arousal were consistently shown to be those sites residents could identify. The relation was, as predicted, a positive monotonic function which did not interact with other emotional dimensions. However, whether these findings would hold with sites rated more extreme in Arousal is unanswerable with these data; future research must utilize sites representing the entire range of rated affect. Additionally, it should be noted that Pleasure was highly correlated with Arousal and Dominance. This may be due to limits on site representativeness, but in any event it would appear to compromise the orthogonality Mehrabian and Russell (1974) report for these dimensions -- at least with the present data.

Berlyne (1967) has presented a compelling case for the role of increases in arousal as a sufficient condition for reinforcement and learning. As rated by Mehrabian and Russell's (1974) instrument, the present findings indicate

this is also true within an urban context. The question which follows from this observation is, of course, what is it about sites which makes them perceived as arousing? Perhaps Kaplan's (1973, 1976) recent observations about distinctiveness within "real world" environments are helpful in answering this question, at least at a macro level of analysis. From an information processing orientation, he suggests those sites which are "distinctive" will be remembered and placed within a cognitive map. In his analysis at least three types of distinctiveness may be identified: visual, inferred, and functional distinctiveness (e.g., a large building, a unique building, and a bus station). Stimuli having these characteristics are "tagged" as salient within the perceptual field. Of interest is that these categories closely parallel the psychophysical, collative, and ecological arousal determinants Berlyne (1967) identified in his review of laboratory work on arousal. By inference, then, it appears that arousing sites in urban settings may be categorized according to their distinctiveness and would have similar properties to arousing laboratory stimuli.

Sites from Muncie having qualities of distinctiveness according to Kaplan's criteria were indeed, those most likely to be rated as Arousing on Mehrabian and Russell's (1974) measure. For example, important intersections, the local university, and residential areas representing extremes in affluence were those rated as highly Arousing. It remains to be seen if they would also be identified as arousing using more "objective" measures. On the other hand, sites low in Arousal were most often those involving minor intersections or housing of average cost. Despite the above, distinctiveness still leaves much unanswered. On an <u>a priori</u> basis, it is difficult to determine if a site is distinctive and, if so, why. Apart from clearly monumental or

essential environmental elements, perception of distinctiveness and the experience of arousal are influenced by the perceiver's prior environmental adaptation (Wohlwill, 1968, 1974) and by personal characteristics and activities.

The dimension of arousal has been a useful concept within basic research on learning. The present data suggest it may also prove of value in further research in environmental cognition. Research concerned with perception of hazardous and preferred environments would seem a particularly appropriate area for its application.

Reference Notes

1. White, M. J. The view from Middletown: Demographic variables affecting cognitive mapping. Paper presented at the 88th Annual Convention of the American Psychological Association, Montreal, September 1980.

2. White, M. J. Cognitive maps: A tale of two cities. Paper presented at the 12th International Convention of the Environmental Design Research Association, Ames, April 1981.

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Footnotes

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Table 1

Affective Ratings of Sites

	Rated Dimension					
	Pleasure		Arousal		Dominance	
Site	Mean	SD	Mean	SD	Mean	SD
1	-1.59	1.46	-1.07	1.49	-0.23	1.07
2	-0.07	1.44	-0.56	1.39	-0.03	0.93
3	-0.89	1.23	-0.76	1.54	0.02	1.03
4	-0.45	1.43	1.02	1.59	-0.04	1.10
5	-0.53	1.38	-1.72	1.20	0.27	1.27
6	0.03	1.66	-0.21	1.28	0.13	0.87
7	2.86	0.80	0.19	1.57	0.10	1.23
8	-0.94	1.60	-0.72	1.78	0.01	1.26
9	-1.34	1.46	-0.30	1.98	-0.09	1.11
10	1.63	1.36	-0.39	1.27	0.17	1.09
11	-1.44	1.48	-0.11	1.66	-0.19	1.02
12	1.38	1.58	1.06	1.26	0.48	1.07
13	0.07	1.65	-0.93	1.49	-0.33	1.19
14	0.25	2.21	-1.48	1.35	-0.10	1.18
15	2.46	1.30	0.71	1.49	0.41	1.27
16	0.00	1.45	-0.70	1.38	-0.06	0.85
17	-0.91	1.39	0.05	1.94	-0.36	1.03
18	1.41	1.93	-0.43	1.54	-0.26	1.68
19	1.40	1.18	0.31	1.23	0.68	1.40
20	1.73	1.20	0.46	1.78	0.60	1.17

Table 1 (con't.)

21	-0.15	1.60	-0.89	1.22	0.05	1.14
22	-0.96	1.48	-1.37	1.15	-0.09	1.20
23	1.06	1.89	0.23	1.58	-0.59	1.23
24	-1.27	1.12	-0.08	1.49	-0.46	0.92
25	-0.25	1.66	-1.51	1.28	0.01	1.10
26	1.35	1.41	-0.23	1.22	0.13	0.96
27	0.94	1.29	-0.85	1.04	-0.36	1.10
28	1.65	1.30	-0.67	1.30	0.13	1.12
29	-0.87	1.69	-0.53	1.46	-0.11	1.38
30	0.23	1.73	0.14	1.52	-0.06	1.09

Table 2

Bivariate Correlations of Affective Ratings and Identification Accuracy

	Pleasure	Arousal	Dominance	Accuracy(H)	Accuracy(Q)	Accuracy(I)
Pleasure	——					
Arousal	.4051*	——				
Dominance	.4725**	.2546	——			
Accuracy for City Half	.1446	.6210***	.3274*	——		
Accuracy for City Quadrant	.2470	.5651***	.3331*	.8858***	——	
Accuracy for Intersection	-.0467	.3673*	.1346	.6264***	.7350***	——

***p < .001

**p < .01

*p < .05

Table 3

Summary of Regression Analyses

Predictor Variables	Multiple R	R^2	R^2 Increase	Beta	F Ratio for Increase in R^2
Criterion Variable: Accuracy for City Half					
Arousal	.621	.386	.386	.739	17.572***
Arousal x Pleasure	.665	.443	.057	.205	2.757
Arousal x Dominance	.674	.454	.012	-.002	.554
Dominance	.682	.465	.011	.369	.498
Pleasure	.693	.481	.016	-.201	.735
Pleasure x Dominance	.705	.497	.016	-.238	.729
P x A x D	.706	.499	.002	-.073	.093
Criterion Variable: Accuracy for City Quadrant					
Arousal	.565	.319	.319	.677	13.139***
Dominance	.598	.358	.038	.372	1.610
Pleasure x Dominance	.626	.391	.034	-.349	1.441
Pleasure x Arousal	.651	.424	.032	.194	1.397
Arousal x Dominance	.656	.430	.006	-.077	.270
Pleasure	.658	.432	.002	-.067	.096
P x A x D	a	a	a	a	a
Criterion Variable: Accuracy for Intersection					
Arousal	.367	.135	.135	.634	4.368***
Arousal x Dominance	.454	.206	.071	-.183	2.409
Pleasure	.490	.240	.034	-.267	1.166
Dominance	.513	.263	.022	.344	.779
Pleasure x Dominance	.528	.279	.016	-.270	.526
Pleasure x Arousal	.535	.286	.008	.128	.243
P x A x D	.541	.293	.007	-.131	.214

*** $p < .001$

[a] Calculation terminated; $F < .01$